P42A-02: Vesta and Ceres as Seen by Dawn

ABSTRACT

Thursday, 17 December 2015
10:35 - 10:50
Moscone West - 2007

Ceres and Vesta are the most massive bodies in the main asteroid belt. They have witnessed 4.6 Ga of solar system history. Dawn's objective is to interview these two witnesses. These bodies are relatively simple protoplanets, with a modest amount of thermal evolution and geochemical alteration. They are our best archetypes of the early building blocks of the terrestrial planets. In particular siderophile elements in the Earth's core were probably first segregated in Vesta-like bodies, and its water was likely first condensed in Ceres-like bodies.

Vesta has provided copious meteorites for geochemical analysis. This knowledge was used to infer the constitution of the parent body. Dawn verified that Vesta was consistent with being that body, confirming the geochemical inferences from these samples on the formation and evolution of the solar system.

Ceres has not revealed itself with a meteoritic record nor an asteroid family. While the surface is scarred with craters, it is probable that the ejecta from the crater-forming events created little competent material from the icy crust and any such ejected material that reached Earth might have disintegrated upon entry into the Earth's atmosphere.

Ceres' surface differs greatly from Vesta's. Plastic or fluidized mass wasting is apparent as are many irregularly shaped craters, including many polygonal crater forms. There are many central-pit craters possibly caused by volatilization of the crust in the center of the impact. There are many central-peak craters but are these due to rebound or pingo-like formation processes? Bright spots, possibly salt deposits, dot the landscape, evidence of fluvial processes beneath the crust. Observations of the largest region of bright spots may suggest sublimation from the surface of the bright area, consistent with Herschel water vapor observations. Ceres is not only the most massive body in the asteroid belt but also possibly the most active occupant of the main belt.

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Session: Vesta and Ceres as Seen by Dawn and Earth-Based Instruments I

Section/Focus Group: Planetary Sciences

Day: Thursday, 17 December 2015